

**UNITED STATES
DEPARTMENT OF LABOR
MINE SAFETY AND HEALTH ADMINISTRATION
Metal and Nonmetal Mine Safety and Health**

REPORT OF INVESTIGATION

**Surface Metal Mine
(Copper)**

**Fatal Exploding Vessel Under Pressure Accident
November 29, 2005**

**SX-EW
Chino Mines Company
Hurley, Grant County, New Mexico
Mine I.D. No. 29-00762**

Investigators

**Brian P. Goepfert
Supervisory Mine Safety and Health Inspector**

**Dani D. White
Mine Safety and Health Inspector**

**James L. Angel
Mechanical Engineer**

**Originating Office
Mine Safety and Health Administration
South Central District
1100 Commerce Street, Room 462
Dallas, Texas 75242
Edward E. Lopez, District Manager**



OVERVIEW

William S. Johnson, maintenance technician, age 42, was fatally injured on November 29, 2005, when a pump barge pontoon ruptured. When Johnson introduced compressed air into the pontoon to check for leaks, the pontoon failed at a welded joint.

The accident occurred because procedures had not been established to safely check the pontoon for leaks when using compressed air. The pontoon was not designed or constructed to be pressurized and was not equipped with a pressure relief valve to prevent it from being over pressurized.

GENERAL INFORMATION

SX-EW, a copper ore solution extraction facility, owned and operated by Chino Mines Company, was located five miles east of Hurley, Grant County, New Mexico. The principal operating official was Richard N. Mohr, general manager. The facility operated two 12-hour shifts a day, seven days per week. Total employment was 64 persons.

Copper ore was drilled and blasted from multiple benches. Broken ore was transported to the plant where copper was extracted utilizing an electro-winning process. Finished products were shipped to customers by truck.

The last regular inspection at this operation was completed on November 2, 2005.

DESCRIPTION OF THE ACCIDENT

On the day of the accident, William S. Johnson (victim) reported for work at 7:00 a.m., his normal starting time. After a maintenance crew tail-gate meeting, Michael Polomski, maintenance foreman, told Johnson to repair a guardrail at the No.8 dam and to repair a pontoon leak on a pump barge located near the “pipe crossover” area of the mine.

The pump barge had been removed from a pit on November 17, 2005 for preventive maintenance on the pump. While the barge was out of service, water was found in one of the pontoons. The day before the accident, Jason Williams, maintenance technician, told Johnson how to test a pontoon for leaks but the test was not conducted then because an air compressor was not available.

About 9:30 a.m., Johnson finished repairing the guardrail and went to the pump barge. He completed an energy inventory control form and a hot work permit. Johnson removed scale from the outside of the pontoon while waiting for an air compressor to be delivered to the area.

About 10:45 a.m., Oscar Holguin and Alfonzo Santa Maria, contractor employees, delivered an air compressor and parked it near the pump barge. After a brief discussion with Johnson, they left the area.

At approximately 10:55 a.m., Robert Mares, a contractor employee, was driving near the pump barge and heard a loud noise. He went to the pump barge and found Johnson slumped over the fender of the air compressor trailer. Mares immediately called for emergency medical assistance on the mine communication system. Several employees arrived at the scene to help.

Deputies from the Grant County Sheriff’s Department arrived and summoned the medical investigator. Johnson was pronounced dead at the scene by the Grant County Medical Investigator. Death was attributed to blunt force trauma.

INVESTIGATION OF THE ACCIDENT

MSHA was notified of the accident at 11:40 a.m. on November 29, 2005, by a telephone call from Joseph Edwards, senior safety specialist, to Jerry A. Millard, supervisory mine safety and health inspector. An investigation was started that day. An order was issued under the provisions of Section 103(k) of the Mine Act to ensure the safety of the miners. MSHA's accident investigation team traveled to the mine, made a physical inspection of the accident scene, interviewed employees, and reviewed documents and work procedures relevant to the accident. MSHA conducted the investigation with the assistance of mine management, employees and the Grant County Sheriff's Department.

DISCUSSION

Location of the accident

The accident occurred near the "pipe crossover" area of the mine, between the quarry and the plant. The ground was level and covered with dry gravel. The weather was clear with a temperature of approximately 48 degrees Fahrenheit.

Pump Barge

The pump barge was constructed at the mine, and consisted of a 94" by 135" deck mounted on several pontoons. The deck was made of fiberglass floor grating and provided support for an electric pump with a 250-horsepower motor with a combined weight of 5,151 lbs.

The pontoons were constructed of stainless steel round tubing with flat stainless steel plates welded over each end. The two pontoons immediately under the deck were about 14 feet long and 35 inches inside diameter. One of these pontoons ruptured while Johnson was testing it for leaks.

Ruptured Pontoon

The pontoon that ruptured was divided into three separate chambers. Two of the chambers were approximately 48 inches long and the third chamber was approximately 70 inches long with a wall thickness of approximately 0.115 inches. The plate at the outside end of the 70-inch chamber was approximately 0.139 inches thick and had a 1/2-inch drain plug near the bottom edge of the plate. The drain plug had been replaced by a threaded fitting to accommodate connections to a supply of compressed air.

The welds securing the plates over the tubing ends were not uniform, full penetration, welds that would typically be found on a pressure vessel. The welds at the outside end of the 70-inch chamber failed under pressure and the plate struck Johnson.

The pontoon was not designed or constructed to be pressurized. The pontoon was not equipped with a pressure relief valve to prevent it from being over pressurized.

Air Compressor and Connections

The air compressor was an Ingersoll-Rand model XP185 WJD. It was rated at 185 cubic feet per minute inlet air flow at 125 pounds per square inch gage (psig). The compressor, manufactured in 1998, was not equipped with an air receiver tank. 31.5 feet of 3/8-inch rubber hose, rated for 300 psig, was connected to the compressor outlet. The compressor and hose were tested and found to be in proper working order.

A 3/8-inch, quarter-turn, ball valve was connected at the output end of the rubber hose. A T-fitting was connected to the output side of the valve, and a pressure gauge was attached to the tee of the T-fitting.

The T-fitting had been connected to a threaded fitting on the pontoon but the force which caused the pontoon to rupture broke the threaded fitting and projected the gauge and valve several feet away from the pontoon. Part of the threaded fitting was found in the output side of the T-fitting. The valve was found about two-thirds open. It had sustained minor damage but was still functional.

Pressure Gauge

The pressure gauge was a stainless steel safety gauge with a range of 0-160 psig. It too had sustained minor damage but was still functional. The gauge was examined and tested with a calibrated gauge. Both gauges were attached to the air compressor involved in the accident. The gauge involved in the accident indicated 125 psig while the calibrated test gauge read 134 psig.

Pontoon Leak Testing Procedure

The mine did not have a written procedure to perform leak testing on pontoons. Mine personnel stated that they generally pressurized the pontoons to between 10 psig and 30 psig with an air compressor before observing the pressure gauge for 30 minutes to determine if the pressure inside the pontoon decreased. If a leak was indicated, they would apply a soap solution to the pontoon to find the leak.

Calculations performed during the investigation indicated that the Ingersoll-Rand air compressor would have pressurized the ruptured pontoon chamber to 10 psig in 9 seconds, 30 psig in 26 seconds, and the maximum 134 psig in 117 seconds.

Training and Experience

William S. Johnson had 18 months of mining experience and had received training in accordance with 30 CFR, Part 48.

ROOT CAUSE ANALYSIS

A root cause analysis was conducted and the following causal factor was identified:

Causal Factor: Procedures and controls were inadequate. They failed to address the hazard of using compressed air to check the pontoon for leaks.

Corrective Action: Procedures should be developed and implemented that enable persons to safely locate leak points on pontoons. Alternate pontoon designs, i.e. foam filled pontoons, should also be considered. Thoroughly train employees in safe job procedures and hazard recognition before work begins.

CONCLUSION

The accident occurred because safe work procedures had not been established to check the pontoon for leaks. The precautions taken to protect persons from injury when using compressed air were not sufficient.

The pontoon was not designed or constructed to be pressurized and was not equipped with a pressure relief valve to prevent it from being over pressurized.

ENFORCEMENT ACTIONS

Order No. 6261410 was issued on November 29, 2005, under provisions of Section 103(k) of the Mine Act.

A fatal accident occurred at this operation on November 29, 2005, at approximately 10:55 a.m., when a miner was applying air pressure to a pontoon vessel on the pump barge. This order is issued to ensure the safety of all persons at this operation. It prohibits all activity around the pump barge until MSHA has determined that it is safe to resume operations in this area. The mine operator shall obtain prior approval from an authorized representative for all actions to recover and/or restore operations to the affected area.

The order was terminated on December 1, 2005. Conditions that contributed to the accident have been corrected and normal mining operations can resume.

Citation No. 6261411 was issued on December 21, 2005, under the provisions of Section 104(a) of the Mine Act for violation of 30 CFR 56.13020.

A fatal accident occurred at this mine on November 29, 2005, when compressed air was introduced into a pontoon, causing it to rupture. In introducing compressed air into the pontoon, the operator failed to take all necessary precautions to protect persons from injury.

The citation was terminated on January 12, 2006, after the operator established safe procedures to include all necessary precautions to protect persons from injury when compressed air is used.

Approved: _____

Edward E. Lopez
District Manager

Date: _____

APPENDIX A

Persons Participating in the Investigation

Chino Mines Company

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|---------------------|---------------------------------------|
| Robert Altamirano | director of health and safety |
| C.M. Jauriqui | safety and health specialist |
| Richard N. Mohr | general manager |
| David F. Rhoades | operations manager |
| Larry R. Todd | hydrometallurgical operations manager |
| Edward H. Valentine | manager of health and safety |

Grant County Sheriff's Department

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| Jose Sanchez | detective |
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New Mexico State Bureau of Mine Inspection

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| Rebecca Boam | state mine inspector |
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Mine Safety and Health Administration

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| Brian P. Goepfert | supervisory mine safety and health inspector |
| Dani D. White | mine safety and health inspector |
| James L. Angel | mechanical engineer |